

ABSTRACT

The present invention is an I²C (inter-IC control) bridge device which implements a communication protocol layered on top of a standard I²C protocol. The layered protocol used by the bridge device is termed the "Layered I²C Protocol" - abbreviated "LIP". Thus the bridge device is called a "LIP bridge device". The LIP bridge device provides I²C address extension, data integrity checking, and fault detection and isolation when inserted between an I²C bus master and its intended target I²C device. Each LIP bridge device has at least two attached I²C busses – a parent bus and a child bus. The LIP bridge operates as a slave on its parent bus, and a master of its child bus. The Layered I²C protocol is specified to operate on a bus between one or more bus masters and the parent bus of one or more LIP bridge devices. The child bus is used for attaching multiple I²C devices and/or one or more LIP bridge devices. In an exemplary implementation, the LIP bridge device is constructed using a microcontroller to create a LIP bridge device with one parent and one child I²C bus port and a group of LIP bridge configuration pins. The parent bus traffic to a given LIP bridge device consists entirely of LIP packets, and the child bus traffic consists of standard I²C packets to communicate with standard child bus I²C devices. The child bus traffic may also consist of LIP packets to communicate with LIP bridges attached to the child bus. By design, the LIP packets and standard I²C transactions do not interfere with one another. The LIP bridge device interprets LIP command packets from a bus master and translates them into the intended I²C data stream that is then broadcast over the child bus. Likewise, data from the child bus is used to create LIP packets that are returned to the proper bus master. The use of LIP packets on a given I²C bus provides an extra level of I²C addressing.